Requested metadata for output from the C20C Detection and Attribution project

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This document lists the metadata for requested variables from the C20C Detection and Attribution project. This is largely consistent with the CF (NetCDF Climate and Forecast Metadata Convention) standard, except for the addition of the *experiment_family* global attribute.

Attribute label	**Example values**
institution	e.g. “Lawrence Berkeley National Laboratory, Berkeley, CA, USA”
institute_id	e.g. “LBNL”
experiment_family	either “All-Hist” or “Nat-Hist” for the core experiment
experiment	e.g. “v1” if experiment_family=”All-Hist”; if experiment_family=”Nat-Hist” then e.g. “CanESM2-p50-v1” for the 50th percentile of the attributable warming estimate from the CanESM2 AOGCM;
model_id	e.g. “CAM5.1-2degree” for CAM5.1 running at $\sim$2-degree resolution
run_id	e.g. 15
institute_run_id	e.g. “ACENat17” if LBNL did not designate this simulation as 15 from the start
forcing	e.g. “SST=NOAA OI v2; SIC=NOAA OI v2; GHG=?; Sul=?; Vol=?; Sol=?”
parent_experiment_family	“N/A” for the core experiment
parent_experiment	“N/A” for the core experiment
parent_run_id	“N/A” for the core experiment
contact	e.g. “dstone@lbl.gov”
references	“http://www.cesm.ucar.edu/models/cesm1.0/cam/”
frequency	“mon” for monthly, “day” for daily, “3hr” for three-hourly, “fx” for time-invariant
creation_date	e.g. “2012-06-07T16:03:20Z”
project_id	“C20C”
title	e.g. “CAM5.1 model at 2-degree resolution output prepared for C20C Nat-Hist using CanESM2’s 50th percentile attributable warming estimate”
license	e.g. “N/A”

Table 1: Global file attributes. Additional attributes as appropriate are welcome.

Label	**Attributes**					**Required for**
	standard_name	**long_name**	**units**	**calendar**	**axis**	
lon	“longitude”	“longitude”	“degrees_north”	*N/A*	“X”	all variables
lat	“latitude”	“latitude”	“degrees_east”	*N/A*	“Y”	all variables
height	“height”	“height”	“m”	*N/A*	“Z”	all near-surface variables
plev	“air_pressure”	“pressure”	“Pa”	*N/A*	“Z”	all variables on pressure levels
time	“time”	“time”	*days_since_????-??-?? with date format Y-M-D)* *e.g.* “days_since_1950-1-1”	*e.g.* “365_day” *or* “gregorian”	“T”	all time-varying variables

Table 2: Attributes for coordinate variables.

Label	**Attributes**			**Level**
	standard_name	**long_name**	**units**	
orog	"surface_altitude"	"Surface Altitude	"m"	surface
sftlf	"land_area_fraction"	"Land Area Fraction"	"%"	surface
mrsofc	"soil_moisture_content_at_field_capacity"	"Capacity of Soil to Store Water"	"kg m-2"	surface

Table 3: Attributes for time-independent surface and near-surface variables. Additionally, all of these variables should have a **_FillValue** and/or **missing_value** attribute designating the flag value for non-existent data (suggested value **1.e+20f**). An **original_name** attribute may be useful for providing the label used for the variable in the climate model.

Label	**Attributes**			**Level**
	standard_name	**long_name**	**units**	
clt	"cloud_area_fraction"	"Total Cloud Fraction"	"%"	summed vertically
hfls	"surface_upward_latent_heat_flux"	"Surface Upward Latent Heat Flux"	"W m-2"	surface
hfss	"surface_upward_sensible_heat_flux"	"Surface Upward Sensible Heat Flux"	"W m-2"	surface
hurs	"relative_humidity"	"Near-Surface Relative Humidity"	"%"	2 m
huss	"specific_humidity"	"Near-Surface Specific Humidity"	"fraction"	2 m
mrso	"soil_moisture_content"	"Total Soil Moisture Content"	"kg m-2"	summed through soil layers
mrsos	"moisture_content_of_soil_layer"	"Moisture in Upper Portion of Soil Column"	"kg m-2"	summed through top 10 cm
pr	"precipitation_flux"	"Precipitation"	"kg m-2 s-1"	surface
ps	"surface_air_pressure"	"Surface Air Pressure"	"Pa"	surface
psl	"air_pressure_at_sea_level"	"Sea Level Pressure"	"Pa"	sea level
rlds	"surface_downwelling_longwave_flux_in_air"	"Surface Downwelling Longwave Radiation"	"W m-2"	surface
rlus	"surface_upwelling_longwave_flux_in_air"	"Surface Upwelling Longwave Radiation"	"W m-2"	surface
rsds	"surface_downwelling_shortwave_flux_in_air"	"Surface Downwelling Shortwave Radiation"	"W m-2"	surface
rsus	"surface_upwelling_shortwave_flux_in_air"	"Surface Upwelling Shortwave Radiation"	"W m-2"	surface
snd	"surface_snow_thickness"	"Snow Depth"	"m"	surface
tas	"air_temperature"	"Near-Surface Air Temperature"	"K"	2 m
tasmax	"air_temperature"	"Daily Maximum Near-Surface Air Temperature"	"K"	2 m
tasmin	"air_temperature"	"Daily Minimum Near-Surface Air Temperature"	"K"	2 m
ts	"surface_temperature"	"Surface Temperature"	"K"	surface
Also requested				
rsdt	"toa_incoming_shortwave_flux"	"TOA Incident Shortwave Radiation"	"W m-2"	TOA
rsut	"toa_outgoing_shortwave_flux"	"TOA Outgoing Shortwave Radiation"	"W m-2"	TOA

Table 4: Attributes for monthly two-dimensional variables. Additionally, all of these variables should have a **_FillValue** and/or **missing_value** attribute designating the flag value for non-existent data (suggested value **1.e+20f**). An **original_name** attribute may be useful for providing the label used for the variable in the climate model.

Label	**Attributes**			**Levels**
	standard_name	**long_name**	**units**	
hur	"relative_humidity"	"Relative Humidity"	"%"	1000, 925, 850, 700, 600, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10 hPa.
ta	"air_temperature"	"Air Temperature"	"K"	1000, 925, 850, 700, 600, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10 hPa.
ua	"eastward_wind"	"Eastward Wind"	"m s-1"	1000, 925, 850, 700, 600, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10 hPa.
va	"northward_wind"	"Northward Wind"	"m s-1"	1000, 925, 850, 700, 600, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10 hPa.
wap	"lagrangian_tendency_of_air_pressure"	"omega (=dp/dt)"	"Pa s-1"	1000, 925, 850, 700, 600, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10 hPa.
zg	"geopotential_height"	"Geopotential Height"	"m"	1000, 925, 850, 700, 600, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10 hPa.

Table 5: Attributes for monthly three-dimensional variables. Additionally, all of these variables should have a **_FillValue** and/or **missing_value** attribute designating the flag value for non-existent data (suggested value **1.e+20f**). An **original_name** attribute may be useful for providing the label used for the variable in the climate model.

Label	**Attributes**			**Level**
	standard_name	**long_name**	**units**	
clt	"cloud_area_fraction"	"Total Cloud Fraction"	"%"	summed vertically
hfls	"surface_upward_latent_heat_flux"	"Surface Upward Latent Heat Flux"	"W m-2"	surface
hfss	"surface_upward_sensible_heat_flux"	"Surface Upward Sensible Heat Flux"	"W m-2"	surface
hurs	"relative_humidity"	"Relative Humidity"	"%"	2 m
huss	"specific_humidity"	"Near-Surface Specific Humidity"	"fraction"	2 m
pr	"precipitation_flux	Precipitation"	"kg m-2 s-1"	surface
ps	"surface_air_pressure"	"Surface Air Pressure"	"Pa"	surface
psl	"air_pressure_at_sea_level"	"Sea Level Pressure"	"Pa"	sea level
rsds	"surface_downwelling_shortwave_flux_in_air"	"Surface Downwelling Shortwave Radiation"	"W m-2"	surface
rsus	"surface_upwelling_shortwave_flux_in_air"	"Surface Upwelling Shortwave Radiation"	"W m-2"	surface
tas	"air_temperature"	"Near-Surface Air Temperature"	"K"	2 m
tasmax	"air_temperature"	"Daily Maximum Near-Surface Air Temperature"	"K"	2 m
tasmin	"air_temperature"	"Daily Minimum Near-Surface Air Temperature"	"K"	2 m
ts	"surface_temperature"	"Surface Temperature"	"K"	surface
uas	"eastward_wind"	"Eastward Near-Surface Wind"	"m s-1"	10 m
vas	"northward_wind"	"Northward Near-Surface Wind"	"m s-1"	10 m
Also requested				
rlds	"surface_downwelling_longwave_flux_in_air"	"Surface Downwelling Longwave Radiation"	"W m-2"	surface
rlus	"surface_upwelling_longwave_flux_in_air"	"Surface Upwelling Longwave Radiation"	"W m-2"	surface
rsdt	"toa_incoming_shortwave_flux"	"TOA Incident Shortwave Radiation"	"W m-2"	TOA
rsut	"toa_outgoing_shortwave_flux"	"TOA Outgoing Shortwave Radiation"	"W m-2"	TOA

Table 6: Attributes for daily two-dimensional variables. Additionally, all of these variables should have a **_FillValue** and/or **missing_value** attribute designating the flag value for non-existent data (suggested value **1.e+20f**). An **original_name** attribute may be useful for providing the label used for the variable in the climate model.

Label	**Attributes**			**Levels**
	standard_name	**long_name**	**units**	
hur	"relative_humidity"	"Relative Humidity"	"%"	850, 700, 500, 250 hPa
ta	"air_temperature"	"Air Temperature"	"K"	850, 700, 500, 250 hPa
ua	"eastward_wind"	"Eastward Wind"	"m s-1"	850, 700, 500, 250 hPa
va	"northward_wind"	"Northward Wind"	"m s-1"	850, 700, 500, 250 hPa

Table 7: Attributes for daily three-dimensional variables. Additionally, all of these variables should have a **_FillValue** and/or **missing_value** attribute designating the flag value for non-existent data (suggested value **1.e+20f**). An **original_name** attribute may be useful for providing the label used for the variable in the climate model.

Label	**Attributes**			**Level**
	standard_name	**long_name**	**units**	
pr	“precipitation_flux”	“Precipitation”	“kg m-2 s-1”	surface
tas	“air_temperature”	“Near-Surface Air Temperature”	“K”	2 m

Table 8: Attributes for three-hourly two-dimensional variables. Additionally, all of these variables should have a **_FillValue** and/or **missing_value** attribute designating the flag value for non-existent data (suggested value **1.e+20f**). An **original_name** attribute may be useful for providing the label used for the variable in the climate model.